

CLAIMS

1. A laser level apparatus including body means, platform means supported by the body means and selectively pivotable about a first axis, drive means supported by the platform means and selectively pivotable about a second axis transverse to the first axis, head means rotatably supported by the drive means and adapted to be selectively rotated by the drive means about a third axis transverse to the second axis, laser means supported by the head means to selectively project laser radiation from the head means transverse the third axis, the laser means includes a semiconductor laser adapted to produce the laser radiation, and the apparatus includes a first rotatable electrical connection means and a second rotatable electrical connection means through which electrical power is supplied to the semiconductor laser.
2. A laser level apparatus as in claim 1 wherein the laser radiation projected by the laser means is perpendicular to the third axis, the third axis is perpendicular to the second axis, the second axis is perpendicular to the first axis, and the drive means may be selectively rotated to a first configuration where the third axis is substantially parallel or coaxial with the first axis and to a second configuration where the third axis is substantially perpendicular to the first axis.
3. A laser level apparatus as in claim 2 wherein the body means has levelling means to enable adjustment of the support of the platform means such that the first axis is within a vertical plane, and thereby when the apparatus is in the first configuration the laser radiation projected by the laser means is within a horizontal plane and when the apparatus is in the second configuration the laser radiation projected by the laser means is within a vertical plane.
- SUB A1 25 4. A laser level apparatus as in either claim 2 or 3 wherein the drive means may be selectively rotated and secured in a configuration between the first and second configurations.
- 30 5. A laser level apparatus as in any one of the preceding claims wherein the drive means includes a motor with a rotatable shaft driven thereby which is coaxial with the second axis and the head means is supported by the shaft.
6. A laser level apparatus as in claim 5 wherein the shaft has two partly coaxial electrically conductive parts insulated one from the other, and the first

rotatable electrical connection means and the second rotatable electrical connection means each includes a respective one of the parts.

7. A laser level apparatus as in claim 6 wherein the first rotatable electrical connection means and the second electrical connection means respectively
5 includes electrical brush arrangements.

8. A laser level apparatus as in claim 3 wherein the levelling means includes two spirit bubbles set transverse to each other and within or upon the platform means for indication of levelness of the platform means, and foot screws spaced about the platform means and acting against the body means with which to adjust
10 the relative position of the platform means with respect to the body means and thereby with the spirit bubbles permit the levelling of the platform means.

9. A laser level apparatus as in claim 3 wherein the levelling means includes two spirit bubbles set transverse to each other and within or upon the platform means for indication of levelness of the platform means, and the platform means
15 includes a shaft projecting substantially perpendicular to a platform plate and substantially parallel to the first axis into the body means through a first hole and at substantially a distal end of the shaft two spring means act to bias the shaft against the action of two radially spaced transverse acting screws with which the platform means may be levelled by tilting the shaft relative to the body means.

20 10. A laser level apparatus as in claim 3 wherein the levelling means includes semi-automated or automated means to effect levelling of the platform means.

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11. A laser level apparatus as in any one of the preceding claims including a stand for supporting the body means in an elevated position above a floor or ground surface.

25 12. A laser level apparatus as in any one of the preceding claims wherein the body means is adapted to rest ~~upon~~ a suitable relatively flat surface.

13. A laser level apparatus as in any one of the preceding claims wherein either the platform means includes a graduated circular scale and the body means includes an indicator mark or vice versa, ~~therewith~~ the rotation of the platform
30 means about the first axis can be determined.

14. A laser level apparatus as in claim 13 wherein the graduated circular scale is selectively rotatable and securable thereby permitting the scale to be set to the indicator mark and the platform means rotated a desired quantity of rotation indicated by the scale.

- 5 15. A laser level apparatus as in claim 14 wherein the platform means or the body means as the case may be includes a ring upon which the indicator mark is, and the ring is selectively rotatable and securable thereby permitting the indicator mark to be rotated to a point closest to the graduated circular scale.

SUB A3 > 10 16. A laser level apparatus as in any one of the preceding claims wherein either the platform means includes a graduated scale and the drive means includes an inclination mark or vice versa, therewith the rotation of the drive means about the second axis can be determined and set thereto.

15 17. A laser level apparatus as in any one of the preceding claims wherein the drive means includes an electric motor and control means to control the rotational position thereof.

18. A laser level apparatus as in any one of the preceding claims wherein the drive means includes an electric stepper motor and control means to control the rotational position thereof and the active state of the laser means.

20 19. A laser level apparatus as in claim 18 wherein the control means is contained within the platform means and connected to the stepper motor and laser means via electrical wiring.

SUB A4 > 25 20. A laser level apparatus as in either claim 18 or 19 wherein the control means permits control of the stepper motor such that it may be rotated to a desired rotational position, oscillated between two rotational positions, or continually rotate about the third axis.

21. A laser level apparatus as in any one of the preceding claims wherein the laser head includes means to collimate the laser with respect to the third axis.

30 22. A laser level apparatus as in any one of the preceding claims wherein the laser head includes support means for supporting the laser within the laser head, the support means including a resilient first bearing means adapted to provide a firm hold of the laser, and a second bearing means including a resilient bearing

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A4 > surface against which and along a collimator axis substantially parallel to the third axis an adjustable means presses the laser.

23. A laser level apparatus as in as in either claim 18 or 19 wherein the apparatus is one including a remote control unit adapted to transmit control
5 setting signals to a receiver within the control means thereby to effect control of the stepper motor and the laser means.

24. A laser level apparatus as in any one of the preceding claims wherein the drive means is supported by the platform means such that the laser head may be rotated so that the laser means lies within a plane within which the first axis lies.

10 25. A laser level apparatus as in claim 24 wherein the platform means and body means have aperture means such that the first axis is unobstructed and that the laser means may project laser radiation through the platform means and body means.

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A5 > 15 26. A laser level apparatus as in any one of the preceding claims wherein the drive means is supported by the platform means so as to be rotatable through 180° relative to the platform means.

27. A laser level apparatus as in any one of the preceding claims including a sensor of the laser radiation which is independent of and moveable with respect to the body means, the detector including two orthogonal intersecting arrays of laser
20 beam detectors adapted to detect the laser radiation and indicate which beam detectors are being irradiate and thereby the sensor indicates whether the sensor is above, below, left or right of the plane or line of the laser radiation.

28. A laser level apparatus as in any one of the preceding claims including a prism mountable in front of the laser adapted to spread the laser beam into a line.

25 29. A laser level apparatus as in claim 28 wherein the prism is adapted to spread the laser beam into two intersecting orthogonal lines.